POPULAR MECHANICS

An Illustrated Weekly Review of the Mechanical Press of the World

"Tells you how to do things" — "Written so you can understand it"

Smithsonian Institution

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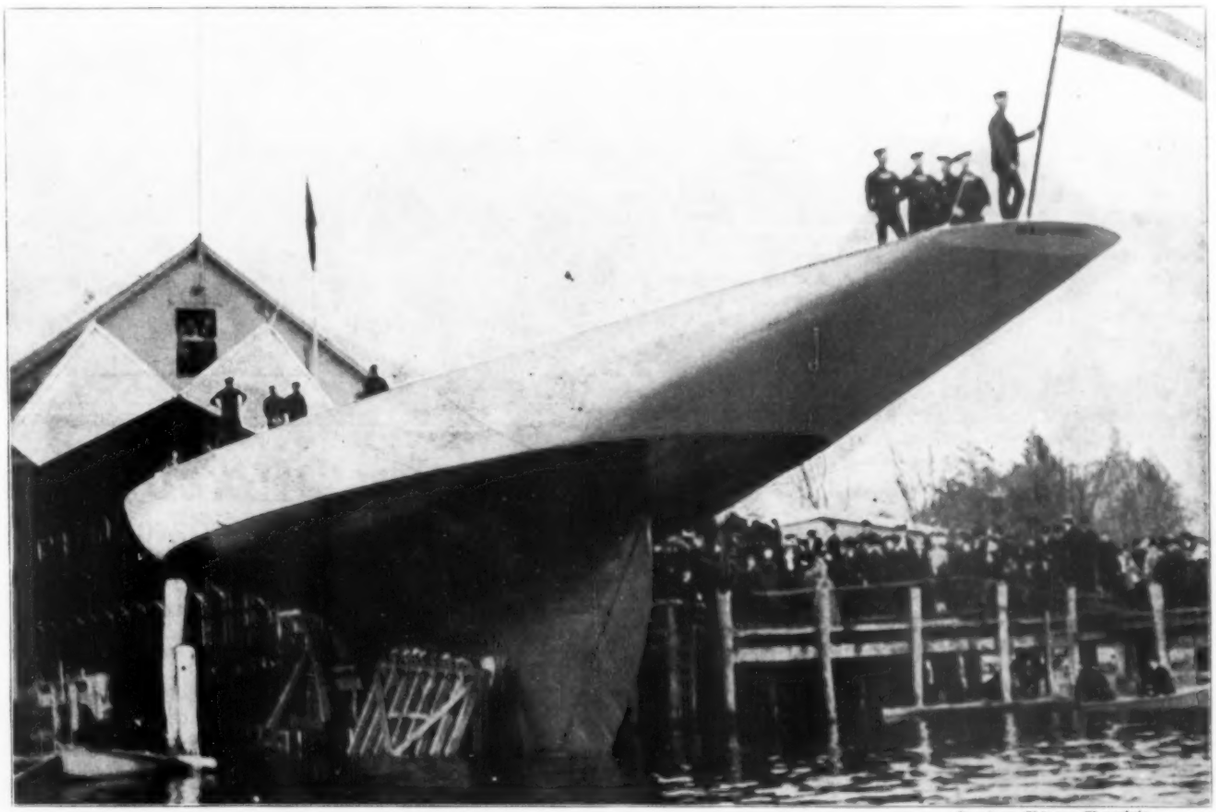
Launching of the America Cup Defender Reliance



Courtesy, Chicago Chronicle

New Yacht as She Appeared when Leaving the Ways--American Yachtsmen Declare Her the Fastest Boat Ever Built

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Newest English Locomotive, a Discarded American Type.
Artificial Race Course.
World's Commerce Turning Westward.

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THE RELIANCE, OUR NEWEST CUP DEFENDER.

Actual Speed is Greater Than Shown in the Test Races in Long Island Sound.

England says Lipton's Shamrock III is invincible. American yachtsmen say the Reliance launched at Herreshoff's, Bristol, R. I., April 11, will prove the fastest vessel ever built. There is going to be a great race off New York between these two contestants in the near future, and the world is now wondering whether it is the English or the American declaration that is true. The Reliance in its test races with Constitution and Columbia in Long Island sound does not show the speed it is capable of making. The maximum speed of Reliance is to be reserved for the edification of Sir Thomas Lipton.

Laurel wreaths and bunches of pinks bedecked the America cup defender, when Miss Cora Iselin, the beautiful daughter of Mr. Oliver Iselin, broke the bottle of wine with a silver hammer and said: "I christen thee Reliance, and may God bless thee." Mr. Iselin is the managing owner of the Reliance. Herreshoff has made a decided departure in the Reliance from his other cup defenders. The new vessel is the American type of flat-floored fin-keeled boat. The stern is exceedingly flat, so that it leaves but little wake, while its bow, although not quite so broad and flat as that of Independence, is still much different from the bow of either Constitution or Columbia. Reliance has a long keel, but owing to her good beam does not carry as much lead in the bulb as the other cup defenders. The bow toward the end is quite sharp, while its taffrail measures scarcely eight feet. Its greatest beam is well up in the shoulders, and is carried aft many feet. At the water line forward it is curved like the inside of a saucer. The boat's strongest point of sailing is with started sheets in a comparatively smooth sea. It goes fast down the wind, its long keel holding it well on its course. The weakest point, therefore, is on the wind with flattened sheets, a point on which Shamrock III is said to be fast. The broad floor of the Reliance causes her to pound considerably, especially in a lumpy sea. The boat, however, with its easy lines and its tremendous sail spread of more than 15,000 square feet, is easy driven, and it is the opinion of its owners and others that the America cup will remain on this side of the ocean another year.

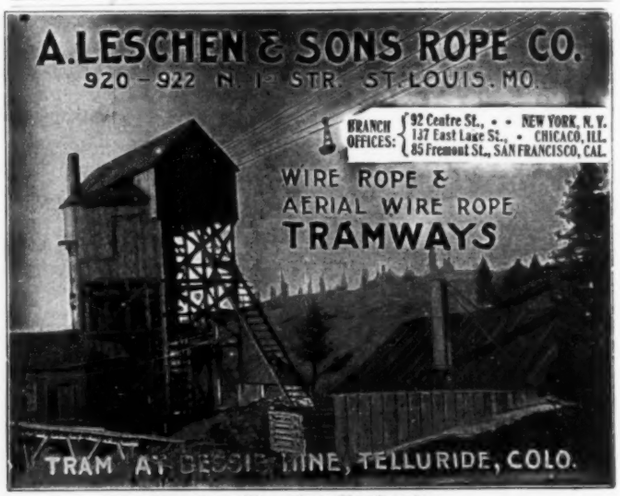
HOW OYSTERS ARE CANNED.

Noted Improvements in Methods of "Shucking" and Preserving Since the Industry Began.

Since the beginning of the oyster canning industry in America in 1820 many advantageous improvements have been made. Originally the oyster shells were opened by hand, but in 1858 Louis McMurray, of Baltimore, introduced the scalding of the oysters before they were "shucked," and this treatment greatly facilitated their removal from the shell. This method was replaced two years later by steaming, a process in which the oysters were put in baskets having a capacity of three pecks or more, and a large number of the baskets were placed in a huge box, through which steam was passed. The modern method of "shucking" was inaugurated by Henry Evans in 1862. His process consists of placing the oysters in cars of iron framework, 6 to 8 feet long, and holding about 20 bushels of unshucked oysters, and the cars are run on a track from the wharf to a steam-tight box, ranging from 15 to 20 feet long, and fitted with appliances for admitting the steam at any desired pressure, and a door at each end of the box permitting the entry of the car, and then so arranged that the doors can be closed, thus making a practically air-tight compartment. The steam is turned on for about 15 minutes, the chest is then opened and the cars run into the shucking shed, where employees, each provided with a knife, are able to separate very easily the oysters from the shell. After they are steamed and "shucked" they are washed in cold water and sent to the "fillers' table." Here they are placed in cans, weighed and hermetically sealed. The cans are then put into a cylindrical basket and lowered into the "process kettle," in which they are steamed to a sufficient degree to kill all germs of fermentation. After coming from the "process kettle," they are cooled in a large vat of cold water and then transferred to the labelling and packing department. The total cost of handling a bushel of oysters in the Baltimore canneries has been estimated at 29 cents, while the average price during recent years of a bushel of oysters for the canning trade has been about 55 cents.

STEAM LOCOMOTIVES COULD NOT MAKE NINETY MILES AN HOUR.

The German Society of Mechanical Engineers offered a large prize a year ago for a train of steam cars running on two surface rails which should maintain a speed of 90 miles an hour. The prize is still unearned. The American Engineer (N. Y.) says: In the last year's competition it was specified that the steam locomotives were to be designed to be powerful enough, and to be capable, with the cars, of withstanding the high speed of 90 miles per hour, a train speed which has been thoroughly demonstrated both here and abroad to be far beyond the limits of possibility imposed by the track and road-bed conditions of the best railway lines.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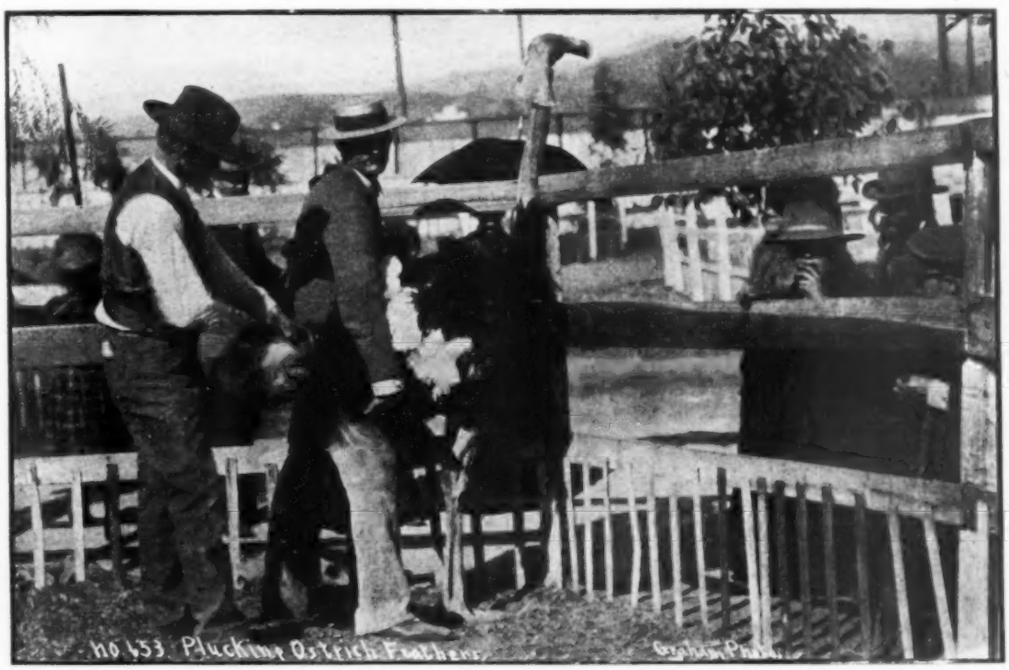
Where Plumes for Easter Hats Come From

New and Great Enterprise That May Make America Famous for Fine Feathers

The American ostrich trust is the latest. It was formed by a number of wealthy New York capitalists who have secured every ostrich in the country that could be bought, and brought hundreds of the birds from Africa and now have them corralled at Phoenix, Ariz. The result will be the establishment of a new and great enterprise in America that may make this country famous for its ostrich feathers. It has been found that the ostrich thrives and multiplies wonderfully in California, Arizona, New Mexico, Arkansas and Florida.

The ostrich, the king of birds, furnishes an income to its owner of about $35 per annum in ostrich feather products. An ostrich chick the moment it is hatched is worth $25. When nearly grown it is worth $150. What might be the value of a full grown pair of layers, hatching some 40 ostriches every year, can only be estimated.

An ostrich lives to the age of about 65 years. It will eat nearly all kinds of waste products peculiar to its surroundings—such as decaying oranges, the common refuse of wineries and olive oil factories, beets, etc. In addition to the enormous revenue derived from the plumes the ostrich on the farms at the present time is worth its weight in gold as



Plucking Plumes for Easter Hats

Ostric Farm at South Pasadena, Cal., Showing Sun Motor in Backgrond

an exhibition. In Los Angeles, Arizona, Arkansas and Florida the ostrich farms are looked on as wondrous curiosities and admission fees are charged to sight-seers who come from afar to view them.

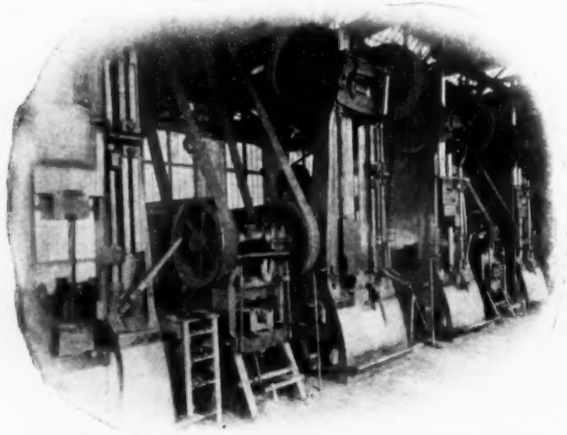
Young Ostriches Just Out of the Shell

Enterprise says: "Perhaps $15,000 a year is received by the Pasadena ostrich farm for the picture it presents of a couple of hundred of these creatures at all ages of life, vegetating in their narrow pens and multiplying for the good of the ostrich trust. Nobody can have an idea of the immense possibilities of this business unless he looks over the record of the African ostrich industry. The time was, and less than 50 years ago, when the ostrich feather only accompanied royalty and nobility or was the pride of the parvenu; when every collection of a dozen ostrich feathers signified the death of an ostrich upon the barren deserts of the Saharas or the Soudan."

WORLD'S LARGEST STEAM AUTOMOBILE FACTORY.

Union of the New England Plants of the Locomobile Company Gives to America a Gigantic Modern Enterprise

All the large plants of the Locomobile Company in New England have been combined into one mammoth factory at Bridgeport, Conn., which will now enjoy the distinction of being the largest steam automobile plant in the world. Improved machinery that has been installed and the advanced methods employed show the handwriting on the wall that America is destined to supersede France as the maker of perfected motor vehicles. Here a visitor can see how each separate part of the automobile is made and assembled and one or more automobiles can be made completely while he looks on; for the factory turns out more than 20 automobiles every day. Every vehicle is subjected to a most rigorous test before it is permitted to leave the shop. The testing room and the room where the great drop forges are located are two of the most interesting departments of the immense factory.



Some Great Drop Forges in the World's Largest Steam Automobile Factory

The Automobile Club of America has decided to accept no more entries for the Gordon-Bennett Cup race.

A $4,000,000 steel plant producing 125 tons per day has commenced operations at Monterey, Mexico.

LARGEST HOTEL IN THE WORLD.

Ansonia of New York Has 2,500 Rooms and There is not a Piece of Wood in the Building

The largest and most wonderful hotel in the world is the Ansonia of New York, an apartment hotel built under the personal supervision of the owner, Mr. Stokes, at a cost of $6,000,000. It contains 2,500 rooms and there is not a particle of wood used in its construction. The floors are of noncombustible material, the doors and windows are boxed with metal and yet in spite of such precautions against fire further security is assured by encasing all elevator shafts and stairways in fire-proof wired glass doors and screens.

Other equipments of this hotel as enumerated in the Hotel World are many private sitting rooms, private elevators from apartments to Turkish baths in the basement, electric curling iron heaters in rooms, private bath rooms for nurses and maids, private pantries in suites with elevators direct to the kitchen, obviating the previous necessity of carrying food through the hallways, flower rooms in the place of palm rooms, automatic devices for noiselessly removing soiled linen and dishes from dining room by an endless chain of shelves, refrigeration for bar room to prevent the taste of pipes, pneumatic table service, bathrooms ventilated by fans in direct communication with the roof, roof laundries for hand work for guests and linen ducts to the main laundry below that will insure the return of soiled house or dining room linen, clean, within ten minutes if required.

Testing Room in the World's Largest Steam Automobile Factory

Compressed Air Cleans Without Dust

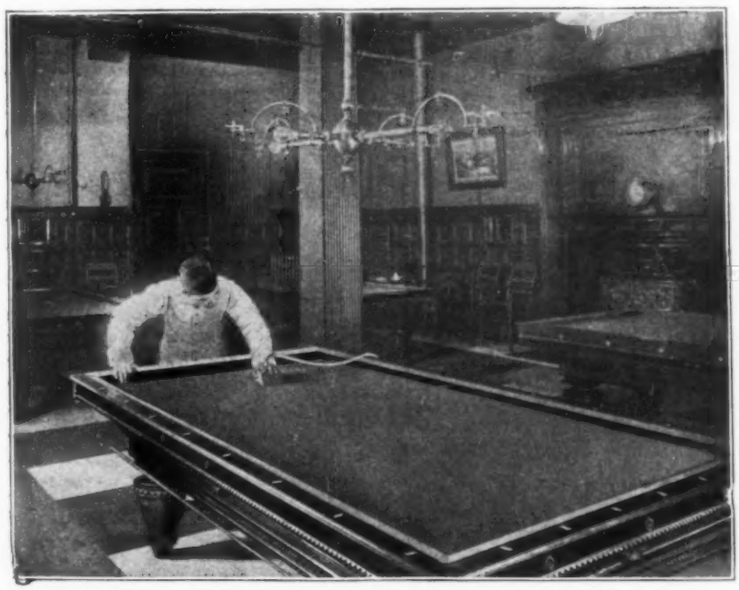
Once Dreaded Household Task Made Simple and Pleasant by Science

No more carpet beating; no more laborious work of taking down, rehanging and re-draping of portiers and other hangings; no more tearing the house all to pieces at the annual cleaning. The compressed air cleaner now does all this work while the upholstery remains in its place. There is no dust; no soiling of hands, no scattering of germs, no arduous labor. By a vacuum process the compressed air cleaner, made by the Compressed Air Cleaning Co., simply sucks all the dust from the furnishings rapidly and thoroughly without letting a particle escape. A woman or a child can do the cleaning and wherever the nozzle of the air hose is placed the dust and dirt disappear like magic. The accompanying illustration shows the operation of cleaning house by this new process. Outside the house is a strong well built wagon upon which is mounted a gasoline engine, reservoirs, cooling tank, with equipments of hose, cleaning machines, etc.

In New York or Chicago a telephone message will bring the wagon to your door and in a few hours of agreeable work the heretofore much-dreaded house cleaning is over and everything in the home is dustless. Some homes and hotels have stationary plants as a part of the household equipment and hence are independent of the wagons. The other illustration shows a boy cleaning a billiard cloth. The boy rubs a stiff brush over the cloth to release the dust and chalk and the hose sucks it away as fast as it is loosened.

Compressed Air says: "Two styles of wagon are built—self-propelling and draught, both being equally efficient except that a team is required to move the latter from house to house. One wagon manned by two competent workmen and an apprentice will clean a ten-room residence in a day."

House Cleaning By Compressed Air



Compressed Air Billiard Cloth Cleaner in Operation

Popular Mechanics want ads. are the best bargains you can find.

The cruiser Chattanooga, launched at Elizabeth, N. J., a few days ago and christened by Miss Nell Chambliss, daughter of the mayor of the city of Chattanooga, has a length overall of 308 feet 6 inches, and 292 feet on the load water line. Her extreme breadth is 44 feet, draught 15 feet 9 inches, and displacement 5,200 tons.

CLOCK THAT WAKES THE DEAF.

Ingenius Alarm Device Invented by Mute

An alarm clock that will awake the deaf has been invented. It is the conception of a deaf mute in the employ of the Washoe Smelting plant, Anaconda, Montana. How to awake at a certain hour has long been a problem among these unfortunate people. Elza Cretzer, the inventor, who seems to have solved the problem, is a water and flue tender at the smelter. His work necessitates his rising at an early hour in the morning, and as he has no means of awakening he set about inventing an apparatus by which he could always be on time. The dropping of a pillow on a sleeping person is the awakening agent and is operated so that the pillow falls at the desired time. An alarm clock is placed in a cigar box which fits it closely. It is then nailed to the wall at the head of the bed. A string connects the clapper of the alarm clock with an ordinary spring mouse trap fastened from the top of the cigar box. By a system of small pulleys and screw eyes a pillow is fastened to the end of the string and pulled to the ceiling directly above the bed. An ingenious arrangement connects the other end of the string to the mouse trap. The clock is set and when the alarm goes off the string attached to the bell clapper springs the mouse trap and releases the pillow which drops on the person sleeping.

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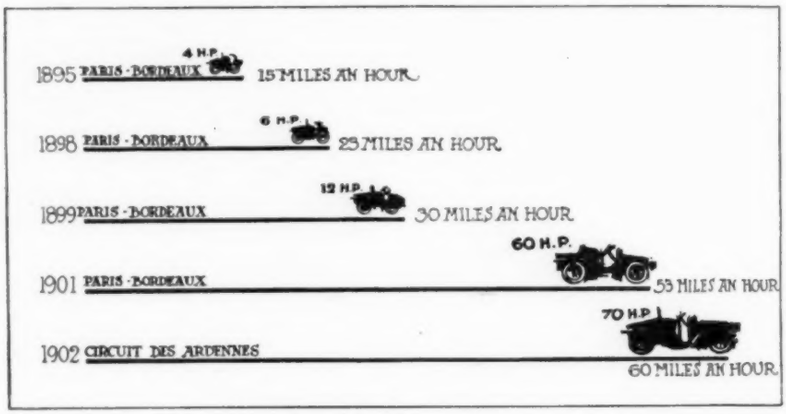
SPEED OF AUTOMOBILES RAPIDLY INCREASING.

Fifteen Miles an Hour in 1895—Sixty Miles is Common Now.

In 1895 the automobile which covered 15 miles an hour was a "scorcher"; now 60 miles an hour is not uncommon. From 4 horse-power to 70 horse-power is the record of growth in the motive power. The Motor Age says:

"Think of scooting across the street and back again in a second, and then you will have some idea of what fast riding in an automobile really means. That is about the rate traveled by M. Augieres when he made the world's record for a gasoline motor car of over 2,000 pounds weight, at Paris on November 17, 1902."

A mile was made in 46 seconds which means 114 feet per second. American machines have made 84 feet per second and are steadily gaining in speed.


1895 PARIS-BORDEAUX 4 H.P. 15 MILES AN HOUR
1898 PARIS-BORDEAUX 6 H.P. 25 MILES AN HOUR
1899 PARIS-BORDEAUX 12 H.P. 30 MILES AN HOUR
1901 PARIS-BORDEAUX 60 H.P. 53 MILES AN HOUR
1902 CIRCUIT DES ARDENNES 70 H.P. 60 MILES AN HOUR

Showing Increasing Speed of Automobiles

The smallest horse in the world has just been bought by A. J. Morrison of Los Angeles, Cal. Though fat and plump the animal weighs but 73 pounds. It is 22½ inches tall and 7 years old.

Balloon Seized by Arabs

Fallacious Attempt of French Army Officer to Cross the Sahara

Fearing attack from the Arabs if he should attempt to cross the Sahara in a balloon, Capt. Deburaux of the French army, decided to first start an experimental balloon across and see how the ghost-like inhabitants of the desert would regard it. The experiment proved the captain's idea a wise one and probably saved his life. The balloon was a light craft modeled after the heavy one the captain intended to ride in during the proposed trip. It was fitted with a guide rope, designed to trail on the ground and regulate the attitude of the balloon. A triangular arrangement of the sails was added and observations taken to ascertain the constancy of wind currents. The experiment balloon rose well and maintained a regular height above the sands. All went well until it had passed beyond Gabes when a band of wanderers of the desert seized it and tore it to pieces. With sticks and clubs they came running from far and near and batted and tore at the craft as they yelled in fiendish glee. This caused the captain to abandon his idea of becoming a passenger in the large balloon, the "Leo Dex." So he started it across without a guide, hoping it could make the trip alone. But it was caught by a sirocco and borne 500 miles out of the way.

Ghostly Looking Arabs Seize Deburaux's Balloon

AUTOMATIC BASEBALL PITCHER.

Invention from Mexico That May Revolutionize the American Game

No longer is it "Casey at the bat." It is now "Casey in the box." This "Casey" is a mechanical pitcher—a machine, in truth, that pitches a "steady" game at no time failing to put the ball directly over the plate. The invention, for it is an invention, comes from the City of Mexico. There they have been trying for a long time to get a first-class pitcher for their newly organized crack baseball team. Failing in every effort, J. R. Montgomery, one of the organizers of the team, went to work and invented a pitcher, and one that threatens to put all the human pitchers out of business. It is modeled on the principle of the clay pigeon trap and Montgomery has named it "Casey."

The Mexico City Herald says: Montey's invention delivers a red hot in, out and grape vine curve directly over the home plate. It resolves itself into a low squat mechanism, full of coiled springs and triggers, with a long arm reaching out from the right side. At the end of this arm a steel hand, encased in a regulation pitcher's glove, has been fitted. The baseball is slipped into the fingers of the hand, which closes upon it with a snap. The arm is drawn back, and the pitcher, after squinting along the two sights, adjustable to either side to allow for wind variations, and getting a head on the home plait, tilts "Casey" to the desired elevation or depression, and pulls the trigger.

There is a swish like the bursting of the concentrated compressed atmosphere from the muzzle of a dynamite gun, the arm of the machine comes around with a swing that would put Jeffries' famous right to shame, and the fingers relaxing one by one twist the baseball out with a spinning, top-like motion, and at the same time propel it down toward the home plate with the speed of an arrow.

TRUE FLYING MACHINE HAS NOT YET BEEN MADE.

Sir Hiram S. Maxim Gives His Opinions About the Coming Airship Races

By Sir Hiram Maxim

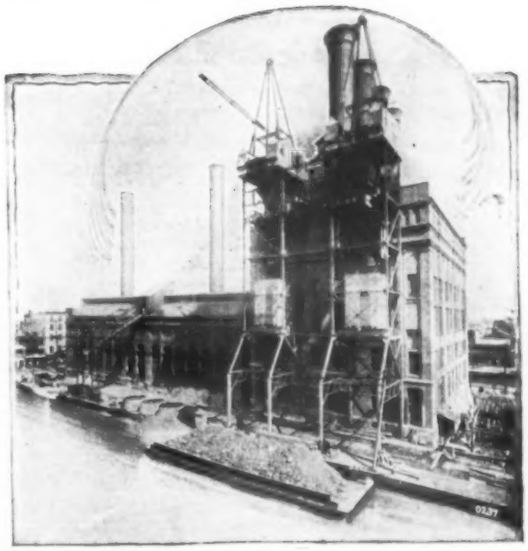
A true flying machine, large enough to carry one man, has not yet been made, although vast sums of money have been spent on experimental work. As far as dirigible balloons are concerned, the French government has already spent a vast sum, and has found that it is quite impossible to make a dirigible balloon which will make headway against even a slight breeze. Santos-Dumont has perhaps done better than the French government experimenters, and I think perhaps he has gone as far as it is possible for any one to go in the direction of dirigible balloons. Still, if we look the matter squarely in the face, I think we shall see that even Santos-Dumont's balloon is not able to travel fast enough through the air to hold its own against even a slight breeze. So I am of the opinion that if there is an exhibition of dirigible balloons at St. Louis, very few of them will be able to return to the point of departure. It will be found, I think, that when these balloons ascend they will travel with the wind, just exactly like any other balloon, no matter which way they are pointed, and that they will descend to the earth just like any other balloon, and have to be dismantled and sent back to the point of departure by some means of land conveyance.

I do not know whether I shall attack the question again myself or not. However, in any case I shall be pleased to send one of my steam engines to St. Louis, which I think is the lightest steam engine for its power ever made in the world.

It is evident that the petroleum motor is the one which lends itself best at the present moment to experimental work on aeronautical machines.

NEW USE FOR CALCIUM CARBIDE.

The use of calcium carbide in raising a sunken ship was recently described in these columns. There is another unique purpose to which it is being put in France. The carbide is slowly fed into a tank of liquid used to spray the vineyards, and, forming an expanding gas, does the work formerly performed by a hand pump.

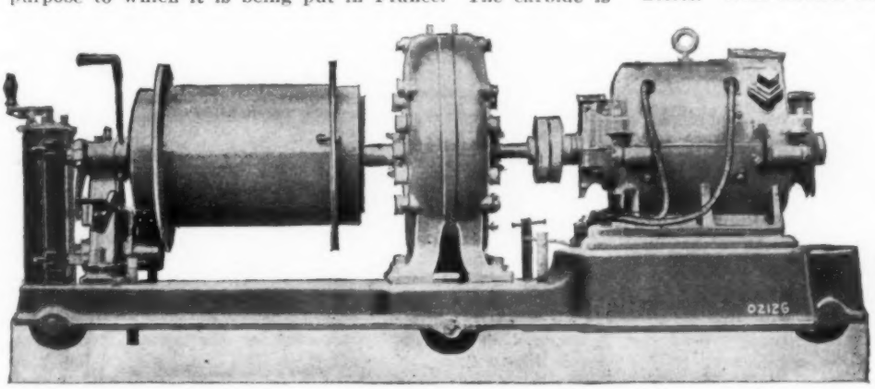


Where Coal is Hoisted Vertically 151 Feet—Power Plant of the Baltimore United Railways and Electric Co. Equipped with Steel Towers, Duplex Shovels and Electric Hoists

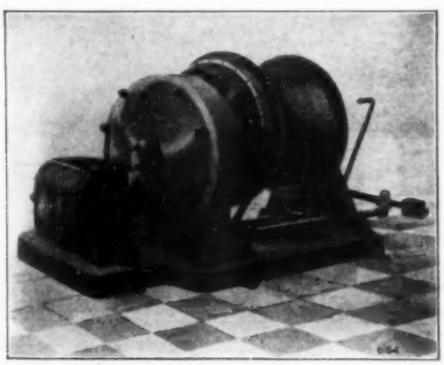
ELECTRIC HOISTS SUPPLANTING STEAM.

Are More Convenient and Economical of Operation for All Uses

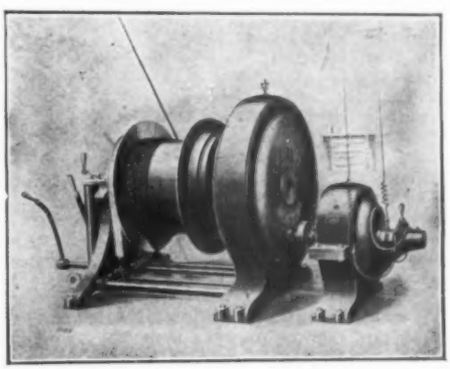
Electric hoists, because of their convenience of installation and economy in operation are fastly supplanting steam hoists. With electric hoists there is no loss due to condensation in long steam pipes, which frequently amounts to 25 per cent of the power used, and there are no steam pipe lines with joints to be kept tight. At one steamship wharf in New York it took three tons of coal per day to run the shafting alone. This loss is entirely eliminated with electric power. Electric hoists can be easily moved from one point to another and are ready for operation by simply leading the wires to a source of electric power. They have the further advantage that power is only used when the hoist is in operation. They can be used in all work where hoisting machinery is necessary. The hoists manufactured by the C. W. Hunt company have motors varying in size from 5 to 200 horse power. The load may be from the lightest package to a load of several tons. Materials may be hoisted with a speed that often reaches as high as 800 feet per minute.



Electric Hoist for Use of Wharves, in Warehouses, on Railroads and for General Hoisting Work



Hunt Hoisting Machine



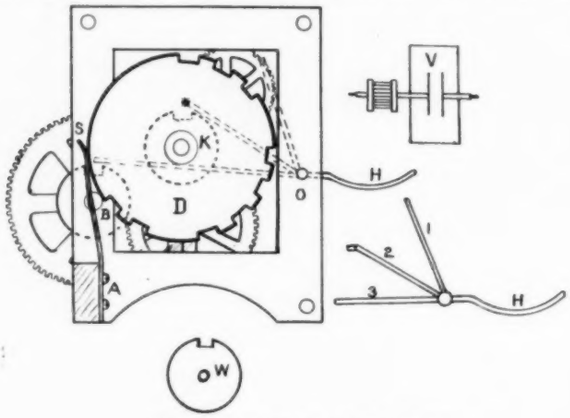
Small Hoist

Easy Electrical Experiments

By L. P. Dickinson

A MODEL FIRE ALARM TELEGRAPH.—PART I.

All modern fire alarm systems depend for their action upon some form of clockwork, which in connection with the electric current, operates the bells or whistles which give the alarm. This might be done in two ways—either by causing the clock-work to close an electric circuit in a special manner, causing the bells to sound each time that the circuit is closed, or by employing the clock-work to break an electric circuit, normally closed, the breaking of the circuit causing the bells to strike. This is the method usually employed in modern systems, for the reason that



Clockwork Mechanism of Fire Alarm

if a wire breaks or any part of the circuit is accidentally opened, the break is noticed at once, and can be immediately repaired.

It is easy to make a model fire alarm system using the works of an ordinary brass clock. This chapter and the following, will describe now to make such a model. On account of the varying sizes met with in different clocks, it is hard to give exact dimensions, but the ingenious reader will easily grasp the main principles, and modify his model to suit the material on hand. A diagram is given below. In this diagram the frame-work and wheels of a simple clockwork are sketched. It is better to use a clock which is provided with a spring and train of wheels for striking the hour, but the description given assumes that this is not available.

Carefully remove the balance wheel and escape lever from the clock. As soon as this is done, the clock will immediately run down at high speed unless care be taken to secure the wheels so that they cannot turn. The first thing to do is to fasten a vane to the shaft of the smallest wheel remaining, such as is shown at V in the figure, the action of which is to prevent the clock from running down too fast. This vane may be made of very thin copper or brass, and need not be fastened very firmly to the shaft, the only requisite being that it shall not slip on the shaft when the latter turns. It should be of such size that the shaft which carries the minute hand of the clock, (that is the long hand), shall make one revolution in about half a minute.

Remove the gear wheel which carries the shorter hand of the clock, and fasten to the shaft which ordinarily carries the minute hand, a brass disc shown at D in the figure. This disc is 2 inches in diameter, and at least 1-16 inch thick. Notches are cut in this disc as shown, the notches being 3-16 inch wide, and the space between them is of the same width. Starting at the part of the disc which is uppermost, cut three such notches, properly spaced, then leave a space of 5/8-inch and cut four notches, then another space of 5/8 inch, and finally cut two notches, giving the disc the appearance shown.

Cut out two discs like that shown at W, 3/4 inch in diameter, and 1-16 inch thick. One of these is to be secured to the main driving shaft of the clock, the other to the shaft of the clock, the other to the shaft which carries the disc D. They should be so fastened that the notches which are cut in them shall stand exactly vertical above their respective shafts, at the same instant of time. These discs must be firmly fastened in place, preferably by soldering.

A hook shown at H must now be made, from a piece of rather stout brass wire. This hook is secured by soldering, to a straight piece of brass rod, which is cut of such a length that it may be pivoted in the frame work of the clock, as shown at 0. To this shaft are secured three other arms, which may be of light brass wire, in substantially the position shown.

The object of the three peculiar arms is this. Arm No. 1 is designed to strike against the vane V on the small wheel of the clock, preventing the wheels from turning. Arm No. 2 is designed to drop into the slot on the middle wheel of the clock, when the slot is in a vertical position relative to its shaft. Arm No. 3 is designed to fall in a like manner into the slot on the main shaft. Now if the two discs have their slots vertical at the same time, the arms No. 2 and No. 3 will fall into their respective slots, and arm No. 1 will strike against the vane, preventing the clock work from turning. If, however, the hook H be pulled down, arm No. 1 should clear the vane V, the wheels should turn, and arm No. 2 will ride on the edge of its disc, while the shaft K turns.

When the shaft K has made one revolution, the arm will try to drop into its slot, but will be prevented from doing so because arm No. 3 cannot fall. The clockwork will turn until both slots again become vertical.

At A is secured a block of wood, and fastened to it is the spring S which bears firmly against the surface of the wheel D, except when a slot passes under the spring, when the latter should break contract with the disc.

The remainder of our apparatus will be described in the following chapter.

CHINESE INNS HOUSE MEN AND BEASTS.

Amid the braying of asses, the bellowing of oxen, the neighing of horses and the bleating of camels, the tourist in China often thinks that hearing is an affliction when he stops at a Chinese inn. In the courtyards of these inns the beasts of burden that plod through the country with pack trains during the day are assembled at night, and they keep up their inharmonious medley of noises until daylight. The packbags, litters and carts that are employed in hauling the commerce from town to town are strewn about promiscuously beside the animals. Such inns as these dot every highway throughout the Chinese empire.

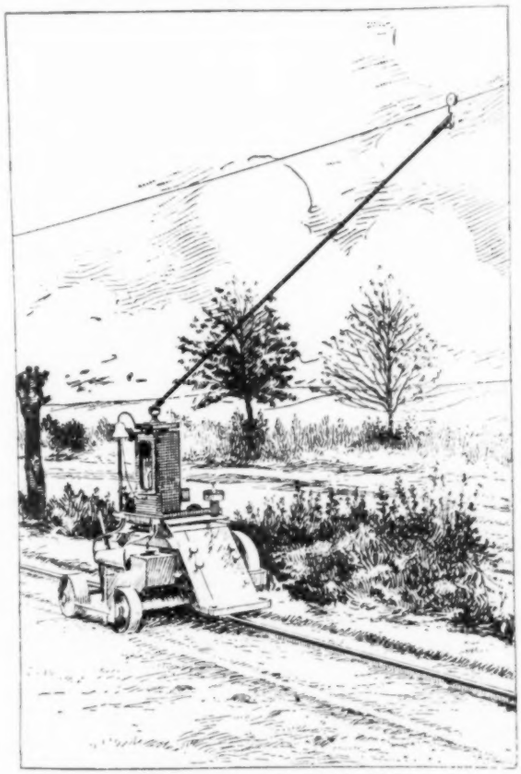
The packtrain, however, is slowly giving way to the American railway train, and the Chinese inn of discordant noises may eventually disappear.

Court Yard of a Chinese Inn—From the Four-Track News

QUEEREST TROLLEY ROAD IN THE WORLD.

Car Runs on One Rail and Hauls Canal Boats

The queerest electric trolley line in the world is in operation near Berlin, Germany. The trolley car runs with two wheels on a single rail and the two other wheels on the ground. Electric power is taken from an overhead wire, and the car hauls canal boats. Consul-General F. H. Mason writes: The German government will employ electric traction engines for towing boats on the Teltow Canal, a new work now in process of construction, which will connect the Havel with the River Spree just south of Berlin. The canal is to be 23 miles in length, with one lock, and passes for a short distance through a lake where tugs instead of towing engines will have to be used. It is to be completed some time during next year, and is expected to have an annual traffic of about 1,500,000 tons. The locomotive is rela-



Trolley Touring Engine on Single Rail

tively light and has two pairs of wheels, which are set at a convergent angle, so that both pairs run on the same rail, the balance of the machine being maintained by a pair of frail wheels running along the adjacent roadway. Almost the entire weight, however, is borne by the inclined wheels on the single rail, and the arrangement is such that the heavier the resistance load created by the boat, the tighter the grip of the wheels upon the rail.

Each "locomotive" will tow a boat of 700 tons, the towline being fastened to the top of a 20-foot mast placed near the bow of the boat. This is to carry the line over other boats moored along the canal.

Apropos of the periodically recurring announcement of the rediscovery of the art of tempering copper, it is interesting to note that the correspondent of the London Ironmonger in South Africa reports that certain tribes in Central Africa have long possessed the secret of tempering copper for use in the manufacture of tools and warlike implements.

The fuse blew out on an electric car in Columbus, O., a few days ago, and the motorman finding his supply of fuses exhausted, asked the women passengers for a contribution of hairpins. He got a couple of dozen. One hairpin used as a fuse carried the car two blocks before it melted, and the supply enabled the car to reach its destination and saved the passengers from having to walk.

THE DREAM OF WINE.

Beautiful Vase in Golden Gate Park, San Francisco

The great vase standing at the entrance of the Golden Gate Park in San Francisco has recently gained a reputation as being an artistic achievement of great merit. The vase

Vase at Entrance of Golden Gate Park, San Francisco

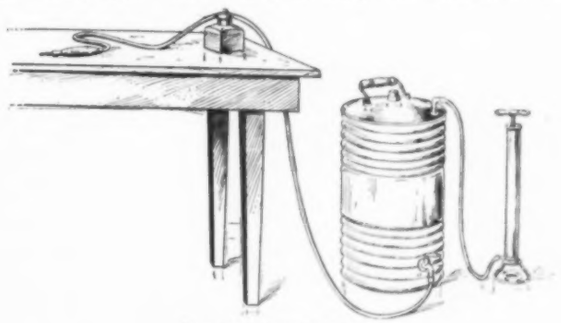
is made of bronze and is called the "Dream of Wine." The design is from a conception of the famous French artist, Gustave Dure.

HOME-MADE PRESSURE TANK FOR PYROGRAPH WORK.

For those of our readers who enjoy pyrography the following directions from the Home Bazaar for making an air compressor will be interesting:

Go to the hardware shop and invest in a 5-gallon galvanized (much stronger than tin) oil can having a screw top and small faucet on side near the bottom. From the bicycle repairer buy a tire valve having a metal tube—same as those used on single-tube tires, and a foot or hand tire-pump. Now have your tinsmith solder the valve in a suitable place on the can—first making a small opening where valve is to be placed. Have the screw top securely soldered—then your can should be perfectly air-tight.

On your way home call on the druggist and purchase four or five feet of rubber tubing, about ½ inch in diameter. Fasten one end of this securely and air-tight onto faucet of your can—the other end to be fastened in like manner to stopper in benzine bottle. Fasten the pump onto the valve and "pump up." From forty to sixty full strokes of foot



Home Made Pressure Tank

pump will store up enough air to keep your point hot a long time—supply to be regulated by a simple turn of faucet. Remember just enough to keep point at heat desired. The cost is about as follows: Can, 75 cents; valve, 25 cents; pump, 20 cents; tubing, 20 cents; soldering, 10 cents.

The De Laval Steam Turbine Co. is using rotary pumps successfully. In their machine, the turbine shaft makes about 3,000 revolutions per minute, while the driving shaft, which is geared to it, rotates much slower—about 1,500 revolutions per minute.

SHOP NOTES

GRINDING TWIST DRILLS FOR CUTTING AIR.

Having had a lot of holes to drill in which part of the drill cut air as shown in the sketches, I had some trouble in drilling the holes straight with the ordinary drill, the tendency being for the drill to shy away from the metal, as

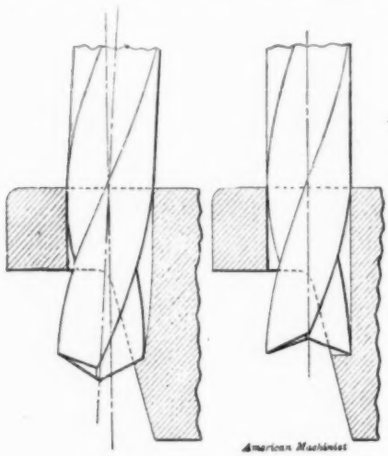


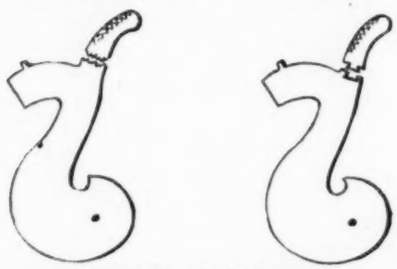
FIG. 1 FIG. 2

Shape of Grinding Drills

shown in Fig. 1. After grinding the drill as shown in Fig. 2, I found it as easy to drill the holes straight as if drilling a full hole, writes a correspondent in the American Machinist. In order to start the drill, it is necessary to use an ordinary drill, drilling just deep enough to enter the blades of the drill as ground in Fig. 2, or a jig may be used to guide the drill in starting. I have been able to do some very difficult drilling in this way, even to drilling less than a half hole, or where more than half of the drill cut air.

THE REPAIR OF BROKEN GUN HAMMERS.

I give herewith the way in which I mend breechloading gun hammers, says a correspondent in the American Blacksmith. To repair the work, I file a dovetailed slot in the old bottom part, hammer out a suitable piece for the top part and notch it to fit the hammer. I then rivet and braze which gives a very satisfactory job.



Repairing Broken Gun Hammers

Popular Mechanics "is written so you can understand it."

ARRANGEMENT FOR QUICKLY DRYING BLUE PRINTS.

A correspondent in the American Machinist tells how he quickly dries his blue prints. The method is so simple and the results so rapid it is something well worth knowing. He says: "After a little experimenting, I ordered a slab of ordinary plaster of Paris, to be about 40x28x1¾ inches. This was made in the following manner: Plaster, mixed very wet, was spread ⅛ inch, or less, thick over the sheet of plate glass from our old sun frame, then more plaster, mixed very dry, built upon this to 1¾ inches thick.

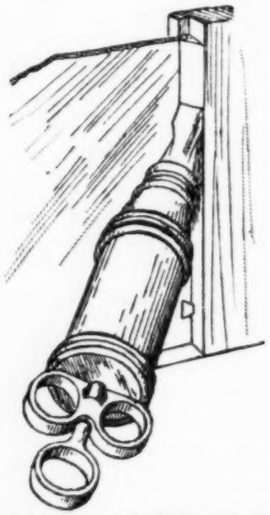
"The finished slab rests, near the bath, on a board at a slight angle, the lower end being over a convenient pan with drain.

"The wet prints are thrown face down on the slab and run over with a rubber roller, 8 inches long, turned and run over again. We can now in five minutes wash and dry a print enough to send it into the shop. Care must be taken not to rub the face of the print on the plaster, or white marks will be the result.

"The slab cost, with labor, only a small sum and after two months' use shows no signs of deteriorating."

IMPROVED PUTTY KNIFE.

A new putty knife invented by a Philadelphian has a reservoir and force feed by means of which the putty is supplied



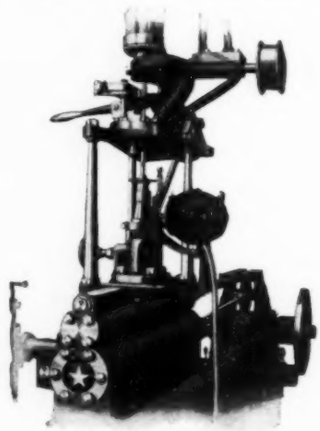
Feeds the Putty Automatically.

as it is needed for use. The new blade has a short flange on one side, which is cut back from the point at such an angle that the tool slides on the edge of the flange while doing its work, the flange serving to confine the putty beneath the blade. The cap at the rear end of the reservoir is removable, and when the latter has been filled and the cap replaced, with the plunger extended, the tool is then ready for use.

Pope Leo declares that he will live ten years longer.

ELECTRIC SPEED CONTROLLER FOR WATER WHEELS.

On account of the increasing use of alternating current generators in large power plants, there has arisen a need for governing apparatus which shall be not only of the highest degree of perfection as regards speed regulation, but which shall also be adapted to meet all sorts of conditions. It is getting to be more and more the practice to control all parts of a plant from some central point corresponding to the conning tower of a ship, where are brought all the electric switches, indicators of every description and signal connections to and from all other points. The Lombard Governor Co., recognizing these facts, has recently made an improvement in its governors which adapts them perfectly to control from such a central situation, and, since the governors control the waterwheels and consequently the generators attached thereto, this improvement enables the officer in charge of the station to start up, stop, or alter the speed at will, of any or all of the machines under his supervision.



Electric Speed Controller

The apparatus for accomplishing this result is extremely simple, consisting merely of two small push buttons on each generator panel on the switchboard, which connect through three wires to a little electric motor, similar to those used for driving fans. This motor through suitable mechanism acts upon the valve stem of the governor in such a manner as to lengthen or shorten the connection between the centrifugal balls and the valve itself. The part of the device attached to the governor is shown very clearly in the illustration.

HOW TO TEMPER STONE HAMMERS.

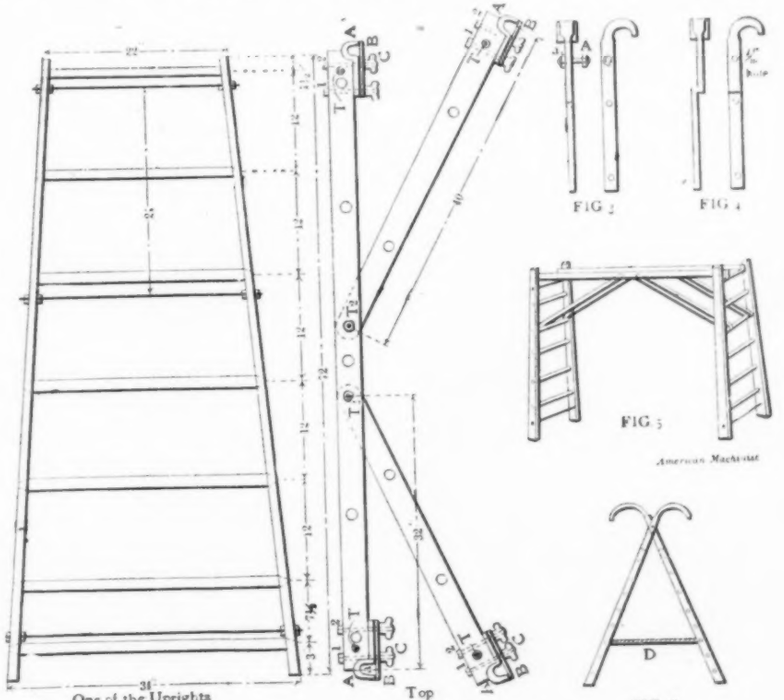
Following are the directions given by a writer in the American Blacksmith. First heat the large end to a good cherry red, seeing that the center is as hot as the edges. Plunge into lukewarm water, leaving there until cooled off. Heat the other end slowly to a good cherry-red, cool in water as above, 2½ inches, draw temper to a good copper color and cool off. The great trouble in tempering comes from over-heating the steel and not cooling off properly. Any tool having a thick stubby edge should be placed in the water at least 2½ inches and held there a little while, as the slower the temper or color comes, the better.

HOME MADE COMBINATION SCAFFOLD.

There is scarcely a plant of any considerable size where a scaffold of some kind or other is not in constant demand. For this purpose the adjustable kind is the best and the one herewith described has quite a number of good points to recommend it, says a writer in the American Machinist.

The dimensions given are of course not arbitrary and can be varied to suit the individual needs or even taste. But to maintain the supporting legs perpendicular to the scaffold deck the ratio of 3 and 4 for the sides and 5 for the brace (or hypothenuse) must be maintained; thus, in the sketches Figs. 1 and 2, we have three dimensions, 24, 32 and 40 inches.

The scaffold, when put together, is like



Combination Scaffold

Fig. 5. Oak, 1x3 inches, is best suited for this style of scaffold. The rungs should be 1¼ inches diameter, but where they enter the uprights and runs they should be reduced to 1 inch diameter; thus, by means of the shoulders and the tie rods T, Fig. 2, the structure is held firmly together.

The ⅜x5-inch bolts 1 and 2, by means of ⅜-inch tapped holes in the hooks A, hold these hooks tightly in place; they then pass through ⅜x1⅞-inch slots in the locking straps B and carry upon their ends the locking wing nuts CC.

The hooks A are of ½x1-inch stuff and their loops, with the strap B closing the opening, should snugly fit the 1¼-inch rungs.

The lock straps B are of ⅜x⅞-inch stuff, and slotted as mentioned above, to allow of their being slid to open and close the openings in the hooks.

The rods at T² serve the double purpose of tie rods and pivots for the four scaffold-deck braces. It is plainly evident that this scaffold is light and exceptionally strong (500 pounds is easily carried by it); it is adjustable for height, and can readily be assembled or taken down, and it occupies (when apart) but little space.

By the addition of the hooks shown in Fig. 3, each scaffold leg is turned into a first-class, extra safe shaft oiling ladder. By the addition of hooks like Fig 3 to one scaffold leg, and offset hooks (right and left) like Fig. 4 to the other leg, and a piece of sash-cord D, a folding rung-ladder like Fig. 6 is formed. These hooks are of ⅜x2-inch stuff. Bolt A. Fig. 3, is ⅜x1¼ inches, and besides being tapped through the hook is locked in position by jam-nut a. The offset c, in the hook Fig. 4, is to admit of one leg going inside of the other. This hook has a 7-16 inch hole, so as to fit easily on bolt A.

CAR WHEELS MUST BE STRONGER.

The steadily increasing size and weight of engines and cars has forced railroads to use heavier rails, more ties, and strengthen bridges and improve road beds. Now it is found the wheels under the mammoth freight cars must be strengthened, for while the loads they carry have increased 75 per cent, the car wheels have increased in weight only 25 per cent, and must travel 100 per cent faster than formerly.

REGARDING A HORSE-POWER.

H. J.—A horse-power is the force required to raise 33,000 pounds one foot in one minute. The unit of measurement is the same whether the force is generated by steam, animal or water power.

Thoz who hav never sukseeded themslfs are alwus the most reddy tew tell others how tew do it.—Josh Billings.

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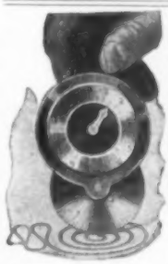

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BIG CONTRACTS FOR AMERICANS.

Contracts involving the sum of $65,000,000 have been obtained by American interests during the last few weeks for the construction of electric traction systems in England, Russia and Holland. These contracts include the conversion of all the horse tramways of St. Petersburg into electrical roads, including the construction of an underground railway and the erection of 16 iron bridges across the Neva.

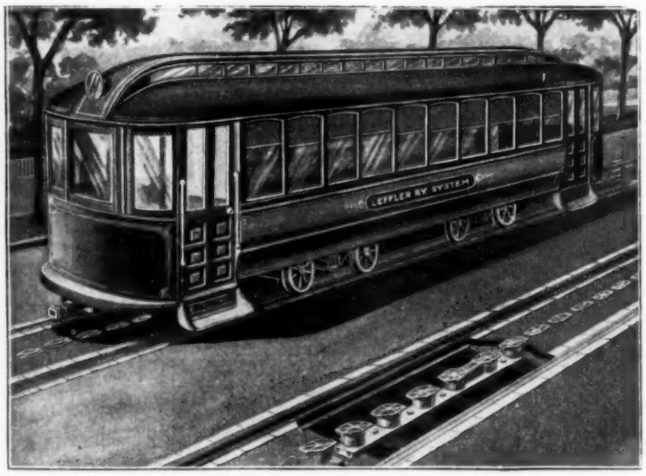
PROPER POSITION OF GLASS IN GREENHOUSE ROOF.

The glass used in greenhouse roofs is usually slightly bent, and the Florist's Review says this glass should be laid with the bow up. The bend in the illustration is somewhat exaggerated to better demonstrate the subject. With the bow up the lights form a series of arches, thus presenting the strongest possible surface against the pressure of wind, snow or hail from the outside, whereas, if these arches are inverted as in the lower figure, it will readily be seen that the roof is materially weakened. Pressure exerted on the outside of a "bow up" light has a tendency to hold the glass tighter between the bars, whereas, in the case with the "bow down" light, the tendency is to loosen the glass. With the "bow up" light, the condensation on the inside is carried outwards to the bar and taken care of by the condensation grooves in the sash bars, these grooves being

Proper and Improper Curve of Greenhouse Roof

made for that specific purpose, but with the "bow down" light the condensation is carried to the center of the light, there to be dropped off at the next lower lap or to get between the laps, freeze and break the glass.

An agreement has been signed between the Dominion government and the Allen Line for the establishment of a subsidized fast service between Canada and Glasgow and Liverpool. The steamers must make at least 21 knots.



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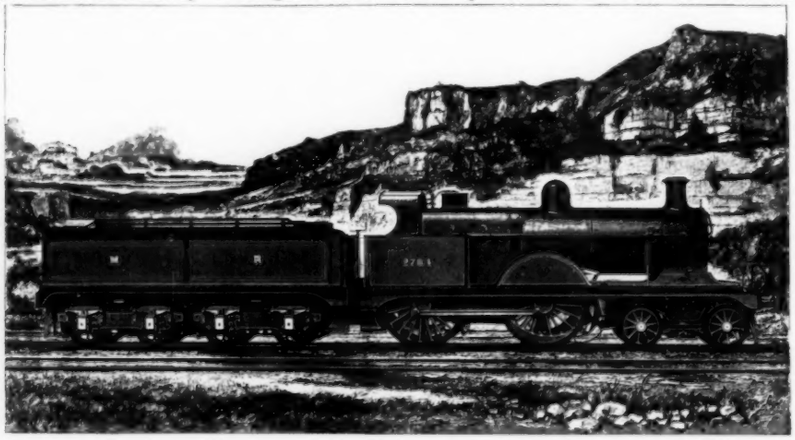
NEWEST ENGLISH LOCOMOTIVE A DISCARDED AMERICAN TYPE.

This is the latest type of high-speed passenger locomotive that has been put in service on the fast express trains on the Midland Railway of England. English railroad men consider this a crowning achievement in modern locomotive construction. The drivers are "inside connected"—a method abandoned by the American locomotive builders nearly a half century ago.



New English Locomotive

In Germany every child is required by law to attend school from the age of six to fourteen.

SAFE TO PROPOSE BY TELEGRAPH.

If bachelors wish to avoid breach of promise suits they should use telegraph banks in doing their proposing hereafter, says Lawyer Abe Hummel, who recently won a case for the defendant in such a suit. The plaintiff's lawyer began to read the alleged proposal of the defendant to the jury as it appeared on a message blank. He began with "My dearest Louise."

Mr. Hummel interrupted. "If the court please, this document is partly printed and partly written. By all the rules of evidence the plaintiff cannot offer parts of that instrument. He must read it all."

The opposing lawyer protested that the printed matter had nothing to do with the case, and that the fact that the proposal was written on a telegraph blank was an accident. The court ruled that everything on the blank should be read. Reluctantly the plaintiff's counsel read:

"There is no liability on account of this message unless the same is repeated, and then only on condition that the claim is made within thirty days in writing." And then, after the signature, "Yours lovingly, John," followed by "N. B.—Read carefully the conditions at the top."

It didn't take the jury long to render a verdict.

HOW ANIMALS ACT IN FIRES.

It is interesting to notice the different dispositions that animals manifest in the event of fire. A horse when the stable burns is wild with fright. A dog in a burning house is as cool as at any other time. He keeps his nose close to the floor and sets himself calmly to finding his way out. Cats hide their faces from the light, crouch in corners and howl piteously. When they are rescued they are docile and subdued, never biting or scratching their rescuer. Birds in burning woods seem to be hypnotized by fire and keep perfectly still; even the loquacious parrot in a fire has nothing to say. Cows are usually easy to lead forth, and if let alone will often find their way out themselves. It is peculiar that rodents seem never to have any diculty in escaping from fires, and few persons have ever known of a rat's being burned to death in a building.

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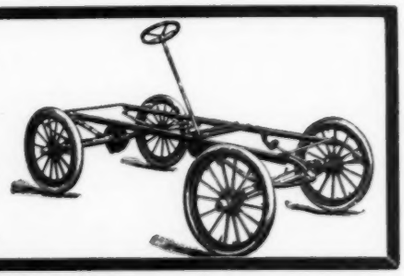

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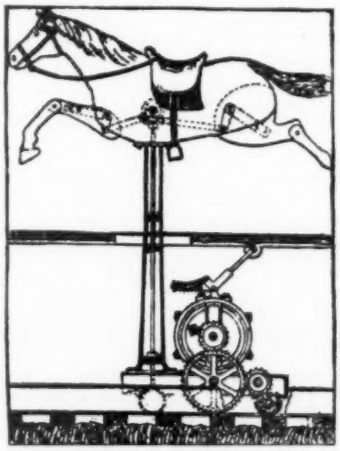
ARTIFICIAL RACE COURSE.

New Whirling Amusement May Supplant the Merry-Go-Round

An artificial race course, invented by Benjamine Beerwald, of Philadelphia, Pa., promises to supplant the merry-go-round and to afford a heretofore unrealized degree of excitement to the admirers of the whirling sport. The principal feature of this new invention is an underground conduit in which a small truck is mounted on rails with an electric motor on the truck and a vertical shaft extending upward to support the animal. The movement of the truck is under complete control of the rider, who may travel fast or slow, according to the pressure which he applies to the bridle leading to the animal's mouth. Inside the mouth is a switch through which the current is turned into the motor, and a pull on the reins swings the lever which makes the contact. The current is taken from a trolley wire suspended in the conduit, and the motor is geared down to the proper speed of revolution for the traction wheels. The animals can be mounted on parallel tracks for racing purposes, and it is probably this feature of the appartus that will afford the most excitement to both the young and the old children.



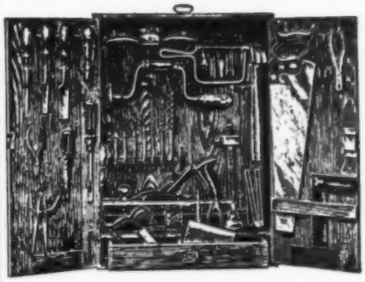
Newest Thing in Merry-Go-Rounds

POPE LEO'S DYING PRAYER.

Here is a translation from the Latin of Pope Leo's dying prayer as written by himself and included in a volume of verse presented by him to each of the cardinals of the sacred college on the occasion of the recent jubilee:

Leo, now sets thy sun; pale is its dying ray;
Black night succeeds thy day.
Black night for thee; wasted by fame; life's flood sustains
No more thy shrunken veins.
Death casts his vital dart; robed for the grave thy bones
Lie under the cold stones,
But my freed soul escapes her chains, and longs in flight
To reach the realms of light.
That is the goal she seeks; thither her journey fares;
Grant, Lord, my anxious prayers.
That with the citizens of heaven, God's face and light
May ever thrill my sight;
That I may see thy face, heaven's queen, whose mother love
Has brought me home above.
To thee, saved through the tangles of a perilous way,
I lift my grateful lay.

WALL TOOL CABINETS



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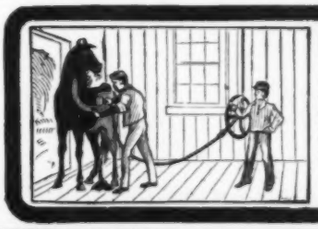

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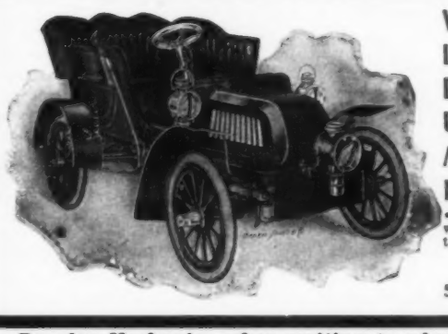

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GERMANS REFUSE TO EAT BORAX.

In the Reichstag the German government has been urged to enforce the regulation against meat treated with borax. The home secretary said the American House of Representatives had passed a bill prohibiting the exporting of foods treated with unwholesome ingredients, and that a motion to except borax from this prohibition has been voted down in the house. The secretary added that the government was determined to enforce the regulation until borax was proved to be uninjurious by unimpeachable scientific authorities.

REMARKABLE MOONLIGHT PHOTOGRAPH.

What is pronounced by experts one of the finest moonlight protographs ever made was taken by H. de Joannis, of Chicago, who is a very accomplished amateur photographer. The scene is a picture of the residence of C. A. Bloomfield,

Strange Moonlight Photograph

Perth Amboy, N. J. The house, built in old colonial style, stands on ground which the Bloomfields purchased in the 17th century direct from the Indians.

The picture was taken on the night of February 10, this year, with 6½ x 8½ camera; exposure lasting from 10 p. m. to midnight. The night was a trifle hazy. The halo at the right is due to an electric arc light in the porte cochere. The electric lights in the house were also burning during the taking of the picture.

TROPICAL TRUTH AMELIORATES

Tropical Truth, ever handsome, may be due to its handsome parentage, appears more attractive than ever in its April issue. Eight more pages have been added to its raiment of pretty thoughts and pictures. Tropical Truth tells truthfully all about the tropics. Those interested in the development of our new possessions and kindred territories find it most valuable. M. V. Richardson is its competent editor and manager.

WORLD'S COMMERCE TURNING WESTWARD.

Canada, America and Alaska the New Highway from Europe to Asia

The world's commerce is turning westward. America, Canada and Alaska are destined to become the great commercial highways through which will stream the great flow of traffic from Europe to Asia. Already European mails and passengers go from London to Eastern Asia by way of Canada and the United States. This is a much shorter route than the old way and a saving of ten days in time is realized.

The tolls through the Suez canal; the size of ships that can pass through the Suez canal; the cost of coal along the route and the distance are the limits imposed on cheap freight traffic from Europe to Asia by the old route. It is not likely that the tolls will be abolished; even if the project of deepening the canal so that large ships could pass, should be advocated, it would take many years to perform the work; the cost of coal along the route, and the great distance, will be a serious drawback.

In Great Britain, on the Atlantic seaboard, on Puget sound and all along the line of the northern roads there is an abundance of coal at low prices. Besides there are numbers of empty freight cars west-bound. Thus it is believed that by building the largest ships in the world, as is now being done, and by making low rates on freight in the west-bound cars, it would be an easy matter to turn the export trade with western Asia from its old way past India, which has been its route for 300 years, to the direct Pacific sea route past Alaska. This can be accomplished even though the great ships run under the more expensive American register.

Residents of the country districts of Hawaii have petitioned the United States postal authorities asking for the benefits of the rural free delivery mail service.

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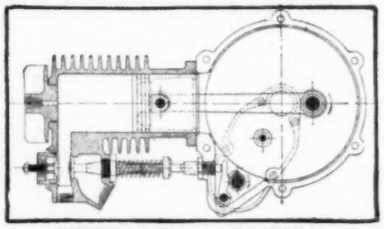

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IMPRISONED IN A BOILER.

Exciting Experience of a Locomotive Repairer at Findlay, O.

Imprisoned for hours in a locomotive boiler with no one near to hear his cries for help and not knowing whether assistance would arrive in time to save his life was the exciting experience of Carl Enz, an employe of the C., H. & D. at Findlay, O. Enz was engaged in repairing the boiler. He entered through the dome, which required quite an effort because of the small apperture. Somehow, when Enz tried to get out, he had either grown larger or the dome had grown smaller or he could not twist himself around in the right position again, for it was impossible for him to squeeze through. It was hours before some passing workmen were attracted by his calls and then fresh trouble began. It seemed, even with their assistance that the man could not be extricated and it was thought for a time that the boiler would have to be cut to free him. It was only after his clothing had been torn from his body and he had been cut and bruised in the breast and back, that Enz was pulled through the hole.

COAL AND WATER USED BY LOCOMOTIVE.

A reader asks how many times engines are changed in running a passenger express train between Chicago and St. Paul. One of the leading roads makes the run with one change of engines, and 22 tons of coal and 41,000 gallons of water are used in the trip, which is a trifle over 400 miles.

Eri Hansford, R. F. D. No. 3, North Topeka, Kan., wants an outfit for drilling wells. He has a 50-horse-power engine and boiler.

GAS FOR FUEL IN CITIES.

A Boston newspaper recently announced that all the gas companies in that city and its vicinity were to be merged, and would eventually furnish gas for fuel only, electricity superseding it entirely for illuminating purposes. Perhaps here lies a partial solution of the coal question, which is this season pressing itself upon public notice through the strike of the miners.

Gas is now largely produced from water, and the process has been greatly cheapened in recent times, and water is an element, the supply of which is not lessened by consumption. The general use of gas for fuel would result in a conservation of the coal supply, especially that of anthracite, which is limited. It is only a question of cheapness, for that mode of producing heat will prevail which costs least. Ingenuity will adapt appliances to its use, whatever it may be. But gas must not only be made cheaper than coal for fuel in order to take its place, but electricity must cost less than gas for light if it is to supersede it in the field of illumination. Possibly that revolution is under way, for certainly the limit of reduction has not yet been reached. The day may be at hand when our houses will be heated and our cooking be done with gas as fuel and our artificial light will come wholly from electricity

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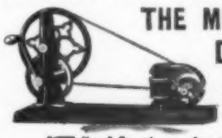

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